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## 論文

## Citizens' Perception and Preference on Urban Forest in Bogor Municipality, Indonesia

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## インドネシア、ボゴール市の都市林に関する市民の認識と選好

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## Abstract

It has been five years since our previous study (Gunawan and Yoshida, 1994). The citizens of Bogor had asked that several areas should be protected from development and kept as green open spaces for recreational activities. This current research was conducted to study public perception and preference of the current condition of green open spaces, especially on the urban forests in Bogor. The citizens were asked to perceptually evaluate the current condition of the city and consider the location of the urban forests by plotting the respective areas on the aerial photograph of Bogor.

Preferred locations for urban forests are along the side of the rivers Ciliwung and Cisadane, within congested commercial areas that suffer from traffic, and in high-density settlements. Those are the issues I will discuss in this paper.

**Key words:** citizen, perception, preference, urban forest, Bogor Municipality

前回の報告 (Gunawan and Yoshida, 1994) ではボゴール市の市民はいくつかの地域がレクリエーション活動のために緑地として開発から保護されるよう求めていることについて述べた。今回は、ボゴール市における最近の緑地状況、特に都市林に対する市民の認識と選好について調査を行った。調査では市民に対して、最近のボゴール市の都市環境についての評価と、都市林の望ましい位置についての空中写真へのプロットを依頼した。その結果、都市林の位置として、交通頻繁な商業地と住居密集地を含んだ、チリウン川およびシサダン川に沿った地域が指摘された。

キーワード：市民、認識、選好、都市林、ボゴール市

## Introduction

Bogor is one of municipalities in Indonesia that has a famous Botanical Garden called 'Kebun Raya Bogor'. In the early years of the Botanical Garden, it was located in the center of the city. While developing and extending the city around it, the authorities purposely kept the Botanical Garden in the center of the city.

Today the Botanical Garden is the largest urban open space in the city of Bogor; others are surrounding the Botanical Garden. The authorities are planning to develop several more green open spaces, including urban forests. According to our previous research, the authorities would be well advised to consider public opinion in developing the city

(Gunawan and Yoshida, 1994b). Public participation could also help the local government utilizing and maintaining green open spaces.

Most of the citizens of Bogor wish that many areas should be kept as green spaces and protected from development. Such areas were suggested to be conservation and recreation areas (Gunawan and Yoshida, 1994a), including urban forests. The later could be able to reduce urban environmental problems (Grey and Deneke, 1986; and Dahlan, 1992) and provide a place for citizens to spend their leisure time within the city. Public participation in improving their own city environment needs to be introduced. That can help the city authorities in planning and developing urban forest. Therefore, public participation by

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researching the public perception and preference of urban forests is needed.

The objective of our research is to study public perception of urban forests in Bogor, and their preference in terms of location for the intended urban forests.

### Research Method

This research is a continuation of the previous study done by Gunawan and Yoshida (1994a and 1994b) in Bogor. The research had been conducted in March 2000 for three months. The method used was field interviews. The respondents in this research were people who came to the public places on purpose. The sampling of the respondents and the places is explained in the next section (Sampling Technique).

#### Question Form

The questions in the questionnaire were divided into two groups. First we asked the respondents to state their perception of the urban forest and its problems. Then we asked the respondents to indicate a suitable location for urban forest by plotting the areas onto an aerial photograph of Bogor. The first group of questions focused on the necessity, type and function of urban forests.

#### Sampling Technique

To determine the people to be interviewed we used purposive random sampling at three places in the commercial area of Bogor. The places were Jambu Dua Mall (North Bogor District), Bogor Plaza (South Bogor District) and Hero Supermarket (East Bogor District). An aerial photograph of Bogor was shown using a panel. The panel was located in the front of main entrance in order to attract the visitors. In each place every fifteen minutes a visitor was asked for an interview.

#### Data Analysis

The data analysis was also based on the previously mentioned study (Gunawan and Yoshida, 1994a). The aerial photographs on which the respondents had indicated their preferences were overlaid. The personal data of the interviewees such as age and gender were

represented in percent of the total.

A meshed map with a 250 by 250 meter grid was prepared in the same scale as the aerial photograph. To count the areas preferred by the interviewees we overlaid the meshed maps on which they had indicated their preferences (both in the forms of transparent sheets). This was done for each of the maps. A grid showing the preferences of the interviewees was prepared, in regard to the percentage of the total of all respondents. We called it the 'frequency of preference'. All grids were treated with the same procedure. The percentage of each preferred grid was counted, then classified into three groups as follows: 1) up to 5 percents, 2) more than 5 percents to 20 percents, and 3) more than 20 percents. The size of black circle (●) represented each group. Small, middle and large black circles represented the first, second and third group. For example a small size black circle in a grid means that less than 5 percents of the respondents preferred this area (grid) to be developed as urban forest (all or a part of the grid).

### The General Condition of Bogor

Bogor consists of 6 districts and 68 subdistricts with total area of 11,850 hectares. It is located between 200 meter and 350 meter above sea level. The Ciliwung and Cisadane rivers extend all the way from Bogor's southern to its northern part. The annual rainfall in the area is around 3,500 to 4,000 mm, the average temperature is about 25 °C and the average relative humidity (RH) is at 70 %.

The population in 1998 was 680,514 people with the annual growth rate at 2.4 %. In the year of 2005 the population is expected to reach around 840,101 people (Badan Perencanaan dan Pembangunan Daerah, 1995).

### Results and Discussion

The total of the respondents was 280 persons and consisted of 51 % males and 49 % females. The age of the respondents was mostly between 20 and 30 years of age (80 %). Most of them lived in Bogor (64.6 %) and the others lived in nearby towns such as Bogor Regency, Jakarta and others.

Table 1. Citizens' Perception on Urban Forest in Bogor Municipality.

Items of Question	Percentage(%)	Items of Question	Percentage(%)
<b>A. The felt condition of Bogor</b>		<b>B. Efforts to Solve Urban Problems</b>	
1. High temperature	77.5	1. Increase green openspace areas in the form of urban forest	54.6
2. Air Pollution	65.0	2. Reduce number of public transportations	47.9
3. Noise	45.4	3. Policy of Local Authority	50.7
4. Dense Housing	46.4		
5. Crowded	74.6		
<b>D. Types of Urban Forest(UF)</b>		<b>C. Wished Urban Forest</b>	
1. UF for Settlement Areas	42.5	1. Produce oxygen (O <sub>2</sub> )	63.6
2. UF for Industry Areas	32.5	2. Urban air becomes clear	76.4
3. UF for Recreation Areas	37.1	3. Reduce noise	34.6
4. UF for Conservation Areas	46.1	4. Conserve water table	60.0
<b>E. Function of Urban Forest</b>		5. Aesthetics	72.1
1. Recreation	45.4	6. Recreation uses	52.1
2. Soil-water Conservation	43.6	7. Scientific research	37.1
3. Reduce dust pollution	62.5		
4. Nature Conservation	48.2		
5. Scientific Research	24.6		
6. City Identity	31.1		
7. Erosion Control	26.8		
8. Wood Production	6.4		

#### Public Perception to Urban Forest

Most respondents were of the opinion that current urban problems in Bogor have developed to be an inconvenience in urban life. Among those are heat islands (77.5 %), traffic jams (74.6 %), air pollution (65.0 %), noise (45.4 %) and the increase of high density settlements (46.4 %), (Table 1). These can be caused by the decrease in area of green open spaces due to further urban development. The following efforts to solve these problems were agreed to by the citizens:

- 1) increase the areas for urban green open spaces, especially in the forms of urban forests
- 2) reduce the quantity of total transports in urban areas
- 3) require housing developers to build urban forests within the residential areas they develop (according to the scale of the housing they develop).

Those were the strong enough measures suggested by respondents. In the previous research (Gunawan and Yoshida, 1994a) the citizens had asked that the green open spaces for recreation should be increased and located around residential areas; either high or low class ones.

The green open spaces in form of urban forests are a public preference that most citizens share. The main

reasons are:

- 1) clean the urban atmosphere (76.4 %)
  - 2) provide aesthetic interest (72.1 %)
  - 3) produce oxygen (63.6 %)
  - 4) are able to conserve groundwater
  - 5) they are a recreation area (52.1)
- and others (see Table 1)

Most of citizens wished that urban forests should be developed in Bogor in order to protect natural resources and to have urban forests within residential areas (Table 1). Those are the most important aspects in improving the city environment and the future development of Bogor (Dahlan, 1992). In our research we found that the natural resources to be protected, were the riverbanks along the Cisadane and Ciliwung rivers within the municipality, but beyond the Bogor Botanical Garden. This has remained unchanged since our previous research (Gunawan and Yoshida, 1994a): one of the areas that should be protected from further development is the Ciliwung riverside, and most citizens wish that this area should be a green area (Gunawan and Yoshida, 1994b; and Gunawan, 1996).

Most citizens evaluated the condition of the residential areas as insufficient (42.5 %) and asked that within those areas urban forests be built to improve at least the environmental quality for residents (Table 1), versus the entire quality of the municipal atmosphere.

The existence of vegetation was very important and needed in all types of residential areas (high, middle and lower class) as well as in traditional housing environments (Gunawan, 2000). This greatly influences the citizen's assessment of the aesthetic quality of a residential area.

#### Perception on Urban Forest Functions

The Bogor Botanical Garden, the largest green open space in the City, was assessed by most of the citizens as inadequate. They still ask for more large-scale urban forests concentrated in one location. However, the citizens expected the desired urban forests to function as dust absorbers, protecting the natural resources, serve as recreational areas and conserve the groundwater (Table 1). Those are the functions expected to improve the local environment. According to Gey, Deneke (1986) and Dahlan (1992), vegetation of urban forest is able to absorb toxic air pollutants. Nevertheless the quantity of vehicles should be reduced through regulations of the local government.

Groundwater conservation and erosion control were also issues mentioned by the citizens in respect to the riverside areas as the most important local natural resources. The citizens required that the rivers, being the crucial water resources, should be effectively protected by designating those areas as urban forests. This would assure erosion protection and reduce landslides for citizens on the riverside.

The development of urban forests, besides the Bogor Botanical Garden, could provide alternative destinations for recreation within the city. The Citizens did not pay attention to the urban forest's function for wood production, since it needs special attention and specific management. In the opinion of the citizens, the Botanical Garden is important for the city's identity and therefore should not be changed into an urban forest. However, they suggested that the urban forests could be used for scientific research.

#### Public Preference for the Location of Urban Forest

In general most interviewee's prefer the urban forests to be along the Cisadane and Ciliwung rivers, within the city and the commercial areas that are often the site of heavy traffic congestion. This includes Warung

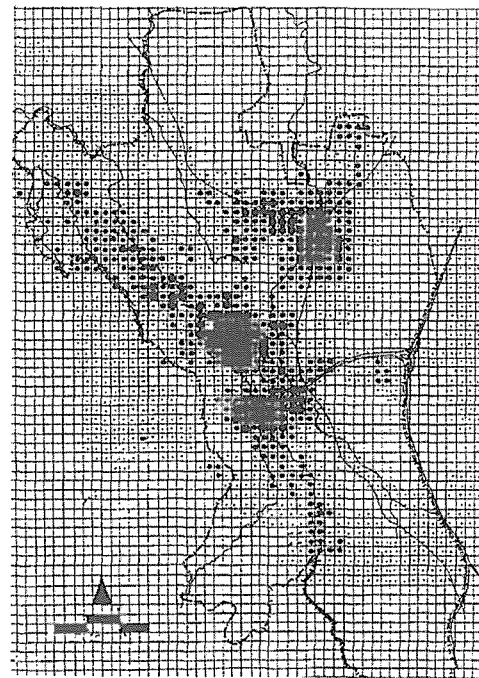


Figure 1. Citizens' Preference on the Location for Urban Forest Development.

(Notes: small size of black circle in a grid is preferred by up to 5 percent of the respondents, middle size is preferred by 5 to 20 percent of the respondents, and big size is preferred by more than 20 percent of the respondents)

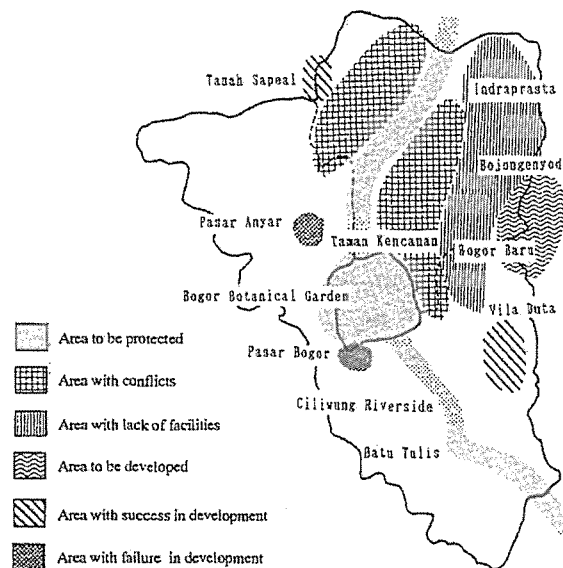


Figure 2. Total Preferences of the Citizens as a Suggestion to the Urban Development Plan (Gunawan and Yoshida 1994a).

Jambu, North Bogor District, Merdeka Area, West Bogor District, and Bogor Plaza Area as well as Central and South Bogor Districts (Figure 1). According to the study by Gunawan and Yoshida (1994a), those areas were preferred by the respondents to be developed (Figure 2). However the fast rate of the development conducted by

the local government was not accompanied by greening this areas adequately. Therefore the citizens desire that an urban forest should be built within those areas.

A large multifunctional urban forest is needed for this area. It should be concentrated within the commercial district. However if this proves to be impossible, it may be realized in the form of a green corridor along the sides of the river and the main streets. The citizens have assessed those areas to lack aesthetic value, especially the streetscape in the commercial district. According to Gunawan (1997) the citizens assessed the streetscape adjacent to the Botanical Garden to have a higher value than the streetscape in the commercial district, the reason being the existence of trees.

The area of Warung Jambu (North Bogor District) is frequently the site of heavy traffic congestion. This area makes a barren and hot impression because of the lack of trees. Even after five years this area still has the exact same character. Therefore the citizens suggested that this area should be the site of an urban forest, hoping to reduce existing problems such as air pollution and it's stern character.

The riversides are at the moment high-density settlements, often slums with very little vegetation. The citizens wish for those areas to be urban forests. Also the citizens that currently life in those areas desire their surroundings to be green and beautiful (Gunawan, 1996). An urban forest in these areas would also function to protect the riverbanks from erosion and landslides.

#### Implications for City Planning

The future development of Bogor should be informed the mistakes of the past. One of the real shortcomings of past development is a lack of greenery. Many buildings in residential as well as commercial areas do simply not have enough vegetation around them. The local government should regulate the building of urban forests for anybody that develops housing and commercial areas in the municipality of Bogor. And not only the making of such regulations is necessary but also their inforcement, for example by encreasing taxes as a penalty. However the local government should also build urban forests and other green open spaces on it's own land. Those green areas could provide

convenience and aesthetic enrichment for the users. Well distributed aesthetical improvements within the city of Bogor could help to reduce vandalism and protests from the citizens (Bourassa, 1992).

Public preference patterns in regards to the location of urban forests as well as the preferences for protection areas are, compared with the previous research (Gunawan and Yoshida, 1994a), relatively consistence and mutually supporting. Well distributed and well structured greenery would support the function of Bogor as a 'garden city', or even as a 'botanical garden city'. The basic concept of a 'botanical garden city' is similar to the concept of a 'garden city', however the collection of plants should be emphasized as one of the functions of botanical garden. Of course the systematical grouping of the plant collections should be based on the one of a botanical garden. Whatever plantmaterial we use, the plants should be listed in the collection of the Bogor Botanical Garden, including the plants in urban forests.

Until now Bogor City has limited it's citizen's participation to questions of perception and preference. However it has shown some interest in 'grassroots' desires and 'bottom-up' planning processes. In further developing the city, it is necessary that the citizens should be indirectly involved in the planning process of the municipality. Participatory forms should be introduced by the local government or the city planners.

#### Concluding Remarks

The drastic changes in Bogor's environment are the basis for a desire by the citizens for many new urban forests. Those would be able to help reduce air pollutants and noise, improve the microclimate and provide visual interest.

Public preference for the location of urban forests within Bogor is generally concentrated along the Ciliwung and Cisadane rivers, the high-density settlements and the commercial districts (Warung Jambu area, North Bogor District, Merdeka area, West Bogor District, and Bogor Plaza, South Bogor District). Future developments of urban forests should have the Bogor Botanical Garden in the center of all urban greenery. Other green open spaces should be in a radial relationship with the botanical garden.

connected by streetscapes and other greenery.

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